

2, 5 and 8-Channel Proximity/Touch Controller Product Brief

Description

The Microchip mTouch® MTCH102/105/108 Proximity/Touch Controller with simple digital output provides an easy way to add proximity and/or touch detection to any application. This device family implements capacitive sensors with active guarding capability. The sensitivity and power mode can be configured through the MTSA and MTPM pins. The MTCH102/105/108 devices also use an advanced optimization algorithm to actively suppress noise from the signal to achieve reliable proximity/touch detection.

Features

- Capacitive Proximity and Touch Detection System:
 - High Signal to Noise Ratio (SNR)
 - Adjustable sensitivity with compensation for different sensor sizes
 - Multi-stage Active noise suppression filters
 - Automatic environmental compensation
 - Support for wide range of sensor shape and size
- Simple I/O Interface with existing System
- Smart Scan Scheduling
- Threshold Hysteresis
- Flexible Low-Power mode
- Brown-Out Protection
- Operating Voltage Range: 2.05V to 3.6V
- Operating Temperature: -40°C to +85°C

Application

- Light Switch
- Portable Device Enabler
- White Goods and Appliance
- Office Equipment and Toys
- Display and Keypad Back-Lighting Activation

TABLE 1: MTCH10X FAMILY TYPES

Device	Data Sheet Index	Sensor Input	Active Guard	Digital Output
MTCH101	(A)	1	N	1
MTCH102	(B)	2 ⁽¹⁾	Y ⁽¹⁾	2
MTCH105	(B)	5 ⁽¹⁾	Y ⁽¹⁾	5
MTCH108	(B)	8 ⁽¹⁾	Y ⁽¹⁾	8

Note 1: One of the sensor inputs can be configured as active guard output.

Data Sheet Index: (Unshaded devices are described in this document.)

A: DS-40001664 [MTCH101 Single-Channel Proximity Detector](#)

B: Future Release [MTCH102/105/108 Dual-Channel Proximity/Touch Controller](#)

Note: For other small form-factor package availability and marking information, please visit <http://www.microchip.com/packaging> or contact your local sales office.

TABLE 2: PACKAGES

Packages	MSOP	TSSOP	SSOP	UDFN	QFN
MTCH102	X			X	
MTCH105		X			X
MTCH108			X		X

MTCH102/105/108

PIN DIAGRAMS

FIGURE 1: 8-LEAD SOIC, DFN

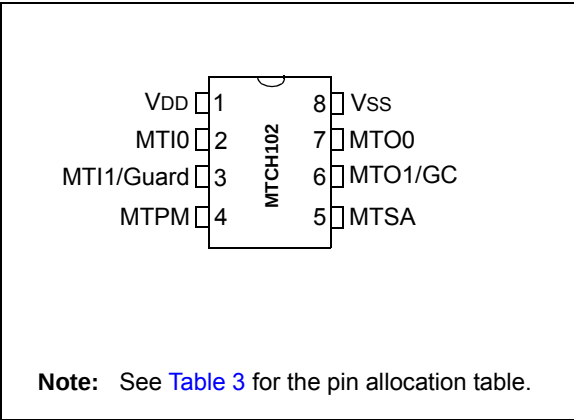


FIGURE 4: 20-LEAD TSSOP

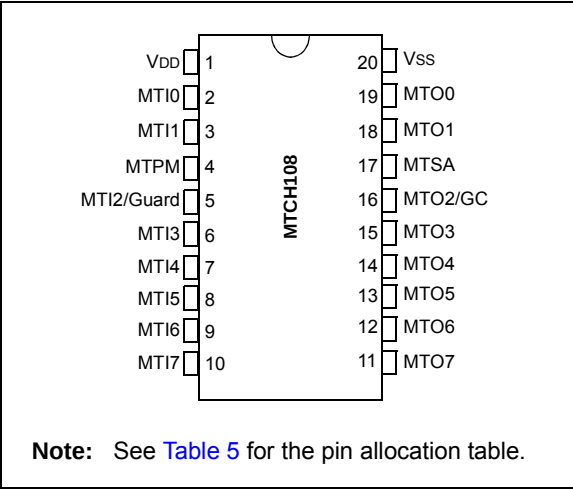


FIGURE 2: 14-LEAD SOIC

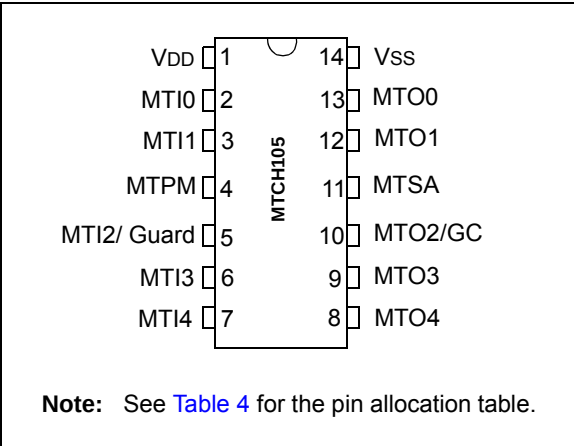


FIGURE 5: 20-LEAD QFN

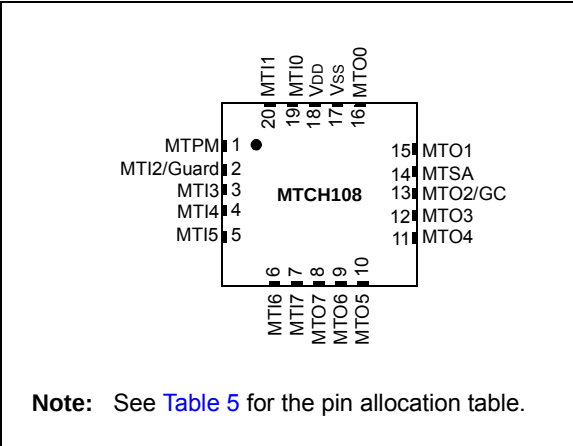
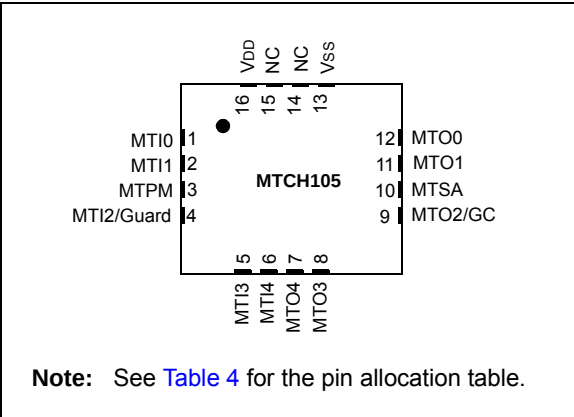


FIGURE 3: 16-LEAD QFN



PIN ALLOCATION TABLES

TABLE 3: 8-PIN DESCRIPTION (MTCH102)

Name	8-Lead SOIC and DFN	Description
VDD	1	Power Supply Input
MTI0	2	Proximity/Touch Sensor 0 Input
MTI1/Guard	3	Proximity/Touch Sensor 1 Input/Active Guard
MTPM	4	Low-Power Mode Select
MTSA	5	Sensitivity Adjust Input
MTO1/GC	6	MTI1 Detect Output (Active-Low)/Guard Control
MTO0	7	MTI0 Detect Output (Active-Low)
Vss	8	Ground

TABLE 4: 14-,16-PIN DESCRIPTION (MTCH105)

Name	14-Lead SOIC	16-Lead QFN	Description
VDD	1	16	Power Supply Input
MTI0	2	1	Proximity/Touch Sensor 0 Input
MTI1	3	2	Proximity/Touch Sensor 1 Input
MTPM	4	3	Low-Power Mode Select
MTI2/Guard	5	4	Proximity/Touch Sensor 2 Input/Active Guard
MTI3	6	5	Proximity/Touch Sensor 3 Input
MTI4	7	6	Proximity/Touch Sensor 4 Input
MTO4	8	7	MTI4 Detect Output (Active-Low)
MTO3	9	8	MTI3 Detect Output (Active-Low)
MTO2/GC	10	9	MTI2 Detect Output (Active-Low) /Guard Control
MTSA	11	10	Sensitivity Adjust Input
MTO1	12	11	MTI1 Detect Output (Active-Low)
MTO0	13	12	MTI0 Detect Output (Active-Low)
Vss	14	13	Ground

MTCH102/105/108

TABLE 5: 20-PIN DESCRIPTION (MTCH108)

Name	20-Lead TSSOP	20-Lead QFN	Description
VDD	1	18	Power Supply Input
MTI0	2	19	Proximity/Touch Sensor 0 Input
MTI1	3	20	Proximity/Touch Sensor 1 Input
MTPM	4	1	Low-Power Mode Select
MTI2/Guard	5	2	Proximity/Touch Sensor 2 Input/Active Guard
MTI3	6	3	Proximity/Touch Sensor 3 Input
MTI4	7	4	Proximity/Touch Sensor 4 Input
MTI5	8	5	Proximity/Touch Sensor 5 Input
MTI6	9	6	Proximity/Touch Sensor 6 Input
MTI7	10	7	Proximity/Touch Sensor 7 Input
MTO7	11	8	MTI7 Detect Output (Active-Low)
MTO6	12	9	MTI6 Detect Output (Active-Low)
MTO5	13	10	MTI5 Detect Output (Active-Low)
MTO4	14	11	MTI4 Detect Output (Active-Low)
MTO3	15	12	MTI3 Detect Output (Active-Low)
MTO2/GC	16	13	MTI2 Detect Output (Active-Low)/Guard Control
MTSA	17	14	Sensitivity Adjust Input
MTO1	18	15	MTI1 Detect Output (Active-Low)
MTO0	19	16	MTI0 Detect Output (Active-Low)
Vss	20	17	Ground

PIN DESCRIPTION

MTIx

Connect the sensor to this input. An additional resistor of at least 4.7 k Ω is recommended for high-frequency noise immunity.

GUARD

The waveform on the Guard pin will shield or guard MTIx's sensor from the effect of nearby noise sources or power planes if the guard trace surrounds MTIx's trace and sensor. The Guard pin will be driven in phase with MTIx to minimize the voltage difference between the two pins.

MTOx

The MTOx pin is an open-drain output, which reports the proximity/touch state of MTIx. A pull-up resistor is required, and it will pull the line low when proximity/touch is detected, and release the line when proximity/touch is released.

GC

By grounding the GC pin, the active guard signal will be enabled on the Guard pin.

MTSA

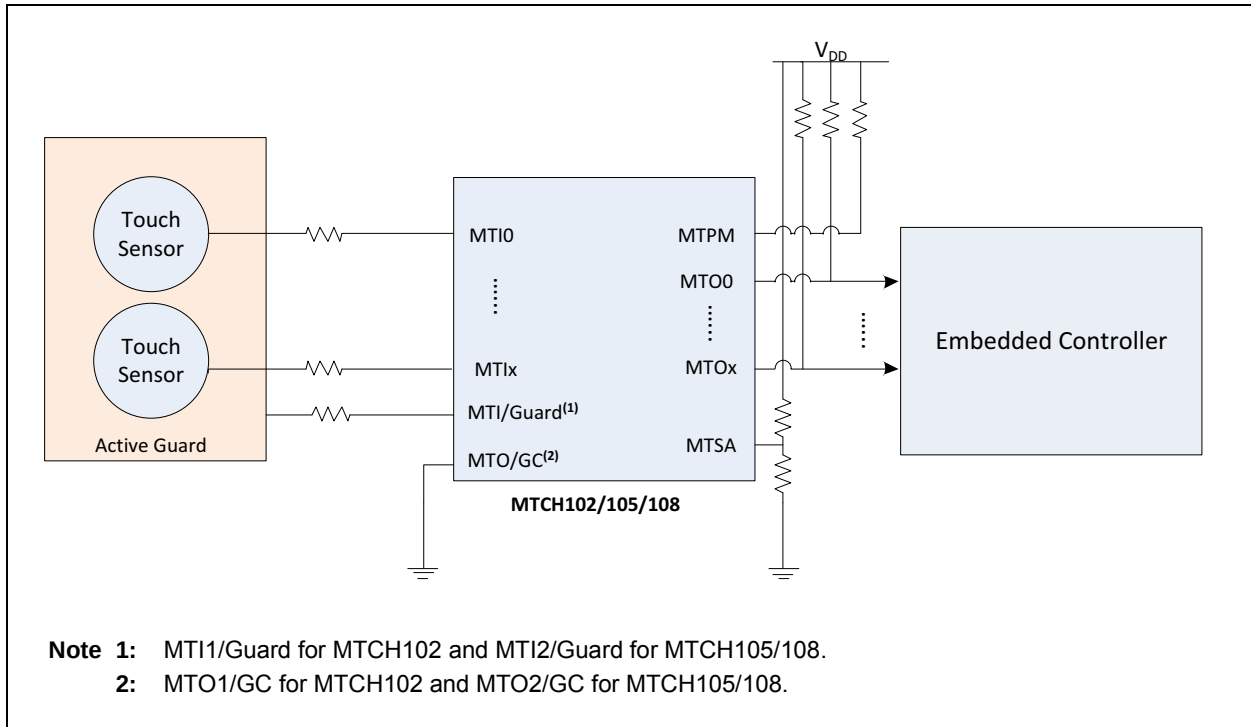
The voltage will determine the sensitivity. VDD voltage will give the lowest sensitivity while GND voltage will give the highest. A linear voltage sensitivity is implemented between VDD and GND. A resistor ladder is used to adjust the sensitivity.

MTPM

By grounding the MTPM pin, the MTCH102/105/108 will be in Low-Power mode, thus having a slower response time. When the MTPM pin is at VDD, the power consumption will be higher with a faster response time.

TYPICAL CIRCUIT

FIGURE 6: SYSTEM DIAGRAM FOR MTCH10X



Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELOQ, KEELOQ logo, Klear, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC³² logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KlearNet, KlearNet logo, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-63277-013-4

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949 ==

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983
Indianapolis

Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon

Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Dongguan
Tel: 86-769-8702-9880

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[MTCH102-I/MS](#) [MTCH108-I/SS](#) [MTCH108-I/GZ](#) [MTCH108T-I/GZ](#) [MTCH108T-I/SS](#) [MTCH105-I/ML](#) [MTCH105-I/ST](#)
[MTCH105T-I/ML](#) [MTCH102T-I/MS](#) [MTCH102T-I/MU](#) [MTCH105T-I/ST](#)